

Pain Management for Acute and Chronic Pain

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Although there are many definitions and opinions regarding acute and chronic pain, for general purposes acute pain is experienced in the immediate post-operative or post-injury period. Chronic pain is any pain state that remains beyond the typical recovery period of 1-5 days post trauma. Many analgesic drugs are available for treatment of both acute and chronic pain; finding an appropriate combination for treatment can be challenging.

Understanding appropriate dosing and multi-modal anesthetic techniques can minimize the side effects associated with analgesics. Phenylbutazone and flunixin meglumine are still mainstays for pain management but we are now armed with new NSAID's and techniques like epidural and perineural catheters for constant local anesthetic administration. There are also drugs like gabapentin, alpha-2 adrenergic agonists and ketamine for dealing with significant or chronic pain.

Pain can be minimized in elective surgical procedures by pre-emptive and post-operative administration of analgesics. For acute injury, analgesics should be administered as soon as possible. Oral or intravenous NSAID's are effective although medication to prevent gastric ulceration should be given to a horse that has been or is expected to be off feed for a prolonged period of time. Opioids are useful for acute and chronic pain. The most commonly used opioids include the short-acting kappa agonist/mu antagonist drug butorphanol, the partial mu agonist buprenorphine and the full mu agonists morphine, methadone and fentanyl (contained in an adhesive topical patch).

For invasive procedures involving significant tissue and/or bone manipulation, perioperative administration of the dissociative drug ketamine or the anti-epileptic drug gabapentin is recommended to minimize or prevent amplification of pain in the central nervous system. These drugs can be administered in combination with an NSAID, opioid or alpha-2 agonist. The same drug protocols can be used for chronic pain states like navicular syndrome, laminitis, neuroma or degenerative joint disease.

Patients presenting for emergency procedures or with existing chronic pain can be challenging for the practitioner. The existing pain must be overcome by aggressive treatment prior to developing a maintenance analgesia plan that minimizes side effects associated with the treatment. These patients are best managed by following a thorough evaluation with a method of pain scoring to evaluate the base-line pain level. As treatment progresses, follow-up pain scoring aids in determining the effectiveness of analgesics. A recommended method that has been validated in horses is the Modified Glasgow Pain Scale (Dutton et al. 2009).

Opioids are helpful when dealing with acute and chronic pain situations although their use presents the complication of dealing with a controlled substance. Butorphanol (a kappa agonist/mu antagonist) is a short acting opioid, therefore only appropriate for acute pain situations, as a constant rate infusion or as an adjunct to sedation. Morphine is an inexpensive, longer-lasting mu agonist that can be used intravenously, intramuscularly, intra-articularly and as a constant rate infusion or for epidural use. When given intravenously or intramuscularly (0.1mg/kg), it is advisable to combine the use of detomidine intramuscularly at 0.001mg/kg to minimize excitement that can be seen with opioid administration.

Epidural opioid administration can produce analgesia for up to 12 hours with minimal side effects. An epidural catheter can be placed, although the ability to appropriately monitor and maintain the sterility of the catheter is more difficult. Methadone is an orally available, inexpensive mu agonist that results in minimal side effects and appears to be effective for some chronic pain situations like laminitis. The dose of methadone is 0.1-0.2mg/kg given orally twice a day in a quick dissolving tablet. Fentanyl patches are additional options for long-term opioid administration. The patches come in multiple sizes but the 75µg/hr or 100µg/hr patches are most appropriate for horses. The effectiveness of the patch depends on blood concentrations; therefore place the patch(es) over a major vessel. The hair should be clipped and the skin lightly cleaned and patch placed and covered with an elastic tape (Elastikon® works very well). The patches appear to show effect within 4 hours of placement and can be left in place for 76 hours. Buprenorphine is an additional opioid available for our patients. It is a partial mu agonist opioid that has been shown to produce analgesia in horses and donkeys with duration between 4-6 hours and can be administered intravenously, intramuscularly and via the buccal mucosa. The suggested dose is 0.006 mg/kg (Messenger et al. 2008).

Constant rate infusion requires an intravenous catheter and monitoring but allows for steady levels of analgesic and is particularly helpful in severe pain situations. Table 1 lists suggested drugs and doses.

Drug	Concentration	Initial Bolus Dose	CRI Dose	Notes
Butorphanol	10 mg/ml		0.1 mg/kg/hr	
Fentanyl	50 ug/ml	2 -10 ug/kg	5-10 ug/kg/hr 0.5-2 ug/kg/min	
Hydromorphone	2 mg/ml	0.02 mg/kg	0.02-0.05 mg/kg/hr	
Ketamine	100 mg/ml	1-2 mg/kg	5-40 ug/kg/min (intra-op)	

			3-5 ug/kg/min (post-op)	
Ketamine/Lidocaine			Dose each drug appropriately	
Lidocaine	20 mg/ml	1 mg/kg IV	0.025-0.1 mg/kg/min	
Midazolam	5 mg/ml	0.01-0.08 mg/kg	0.01-0.05 mg/kg/hr	
Morphine	15 mg/ml	0.1 mg/kg	0.1 mg/kg/hr	

Gabapentin, an anti-epileptic drug, is becoming more popular as an adjunct to pain management in cases involving neuropathic pain (neuropathy, laminitis, etc.). Davis, JL et al. published a case study in JAVMA in September 2007 titled “Gabapentin for the treatment of neuropathic pain in a pregnant horse”. The article discusses the use of the drug for a 24 year old pregnant mare suffering from post-operative femoral neuropathy. The result was quick resolution of pain and consequent successful foaling. Gabapentin is inexpensive (about \$30 per 100 tablets at 300mg per tablet) and administered at 2.5mg/kg orally twice a day, although in the published report the dose administered was given every 8 hours for the first 24 hours and then at 2.5mg/kg orally twice a day for three days and the same dose once a day for the following 3 days.

In cases of significant foot pain, peri-neural catheters can be placed along the palmar digital nerves. These catheters allow constant administration of local anesthetic using a soaker catheter. ReCathCo. and Mila produce catheters that are effective and include administration balloons for the local anesthetic (Dreissen et al. 2008). Placement of these catheters is facilitated by use of ultrasound although in most horses, the nerve is easily palpated for determination of placement.

Lidocaine patches (Lidoderm®) have potential for local analgesia. The patch is supplied as 700mg of lidocaine on a 10 x 14cm felt backing that can be cut to fit the location. The patch does not appear to depend on systemic uptake; therefore it is important to place the patch over the affected area. The patch depends on contact, therefore it should be covered with an elastic tape or the edges glued onto the location. These patches may be suitable for laminitic cases, over septic joints, for back pain and over arthritic joints.

Treating acute pain pre-emptively or quickly aids in preventing the development of chronic pain. Acute and chronic pain can hinder healing while chronic pain can progress to an alteration in the neuroanatomy of the pain pathways resulting in intense or prolonged pain responses. There are a large number of options for the equine veterinarian when dealing with pain; the key is understanding when and how to use them appropriately.

References

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